

Dr. Ken Pfeuffer

Postdoc Researcher

Forschungsinstitut Cyber Defence (CODE)
University Bundeswehr Munich
Carl-Wery-Straße 18, 81739 München
München 81739 Germany

Phone: 0160-966-22-676
email: ken.pfeuffer@unibw.de
URL: <http://kenpfeuffer.com>
LINKS: [google scholar](#), [dblp](#)



Born: December 03, 1985—Hamburg, Germany
Nationality: German

Bio

Since May 2018 I hold a position as postdoctoral researcher at the Bundeswehr University in the Usable Security and Privacy group headed by Prof. Dr. Florian Alt. Prior to my postdoc, I conducted my PhD research from 2013-17 at Lancaster University in the UK under supervision of Prof. Hans Gellersen and Dr. Jason Alexander. In 2016, I interned with Dr. Ken Hinckley and Prof. Bill Buxton at Microsoft Research at the Natural Interaction Group. In 2017, I interned at Google Research & Machine Intelligence in Mountain View, USA with Dr. Yang Li. Prior to my PhD, I received my bachelor and master degrees in computer science at the University of Duisburg-Essen.

Areas of Research

Human-computer interaction • Eye-tracking • Usable Security • Augmented/Virtual reality • Pen based computing • Interaction Modelling

Research Summary

- PC chair for COGAIN@ETRA'19 and poster chair for MUM'18
- Associate chair for CHI'19-20 and Mensch und Computer'19
- Reviewer in various HCI venues (CHI, UIST, MobileHCI, ETRA, IMWUT/Ubicomp, etc.)
- Google Faculty Research Award 2014 (≈ 40000 €)
- Published 22 papers with ≈ 300 citations with an h-Index of 10.
- 8 publications at top conferences in human-computer interaction (CHI'16-19, UIST'13-16)
- UIST 2015 conference best paper nominee (top 8%)
- Internships at both Google and Microsoft Research in US

Research Interests

MOTIVATION

I am highly interested in experimental, novel, and dynamic ways to interact with computers. I prefer *explorative* research, towards not only answering existing questions but to also raise new questions. I believe that new ideas should firstly be tried out, with rapid improvement iterations – instead of diving too quickly into the study of empirical evidence – to better understand the strength, limitations, and application of the research artifact. I have been inspired to this thinking from my PhD supervisors and design researchers at Microsoft.

AREAS OF INTEREST

My research focuses on Human-Computer Interaction and Eye-tracking for the past 7 years. I contributed to multimodal UI design and eye-based interaction methods, and pursue other inspiring areas and research overlaps.

Input and UI design Love to design techniques that fuse input devices and modalities in a dynamic, experimental, and natural way. This includes input constellations of eye gaze and multitouch (UIST'14-16), digital pens (UIST'15, CHI'16-17), 3D hand and head movement (SUI'17, IEEE VR'19). Currently, I supervise projects that improve the UI in everyday AR interactions (submitted to UIST'19) and text writing applications (ETRA'19).

Eye-tracking Much of my work focuses on improving eye trackers and using them in novel ways. We introduced a new method to calibrate the eye tracking devices, to make them easier to use without assistance (UIST'13, ETRA'19). I introduced intelligent interaction concepts that enhance the default UI with additional gaze controls (UIST'14-16). I worked on studies for understanding visual attention in bimanual UIs, mobile scrolling, and VR (CHI'16, CHI'18-19). Currently, the EyeMob project investigates visual behaviour in mobile devices.

Biometrics At the Bundeswehr University, I started working on biometrics, such as in VR where we assessed how to identify users based on head and controller movement (CHI'19), and collaborated in understanding the user's perception of biometric, physical, and behavioral methods (MUM'18). Currently, the BehaVR project is investigating biometrics for full-body motion, multiple users, and shared virtual rooms.

Sketching and Design I am interested in tools and techniques that enhance the user's capability to sketch and design. At Microsoft Research I developed applications that merge stylus and multitouch input on mobile tablet devices (CHI'17). I built a design application that intelligently considers visual attention for stylus users (Best Paper Nominee, UIST'15), and studied performance characteristics in gaze-supported drawing (CHI'16). Currently, I supervise multiple projects that enhance a stylus with 3D interaction capabilities (submitted to UIST'19).

Interaction modelling I am interested in modelling and prediction of user interactions. At Google Research we developed models for the mobile grid UI, that allows to predict how long it takes for users to accomplish the task (CHI'18). At the Bundeswehr University, we assess models to identify users based on head and hand motion in VR (CHI'19). Currently, in the BehaVR project, we aim to investigate full-body motion, multiple users, and multiple virtually-connected remote rooms. In the EyeMob project we collect interaction data on smartphones to predict touch locations, personality traits, and cognitive load.

AR/VR I am fascinated by new 3D mediums and started to explore new ways to interact in VR using gaze and hand gestures (SUI'17), biometrics in VR (CHI'19), and gaze UI design in AR (in submission to UIST'19). With the BehaVR project, there will be a strong focus on collaborative VR research in the near-term future.

Projects

- 2018-now **BehaVR:** In this project I organised the build-up of a large-scale VR environment. This project initiated with an internal ≈ 160000 Euro lab fund from the Bundeswehr University. It sets a platform for user behaviour analysis in room-scale virtual and real environments for multiple persons and tracking technology (eye gaze, hand tracking, body motion). For example, one project is a collaboration with Prof. Dr. Stefan Schneegass from the University of Duisburg-Essen, where we aim to create a "Holoroom" – connecting two physical VR labs across different cities into the same virtual room. Until now, the project involves 2 master and 4 bachelor thesis projects.
- 2018-now **EyeMob:** This interdisciplinary project is a collaboration with the LMU Media Informatics (Dr. Daniel Bushek) and LMU Psychology Department (MSc Ramona Schnödel). The idea is to assess eye gaze and touch behaviour in mobile app usage, and their potential to predict gaze/touch user actions, personality traits, and cognitive load. The project involves two master thesis, three bachelor students, and a user study with 150 participants.

Professional Experience

- 2016 Internship Microsoft Research, Redmond, WA, US
Project: *Thumb + Pen Interaction on Tablets (CHI'17)*
Developed interaction concepts using a pen and multitouch gestures on tablet computers.
Supervisors: Ken Hinckley, Michel Pahud, Bill Buxton
- 2017 Internship Google Research & Machine Intelligence, Mountain View, CA, US
Project: *Analysis and Modelling of Grid Performance on Mobile Touchscreen Devices (CHI'18)*
Developed models that can predict user performance on mobile grid interfaces.
Supervisor: Yang Li

Education

- 2017 PhD in Human Computer Interaction, Lancaster University, UK
Thesis: *Extending Touch with Eye-gaze Input*, supervised by Dr. Jason Alexander and Prof. Hans Gellersen
Eye-tracking technology is advancing and can be soon integrated into our existing UI. This thesis contributes the design of UI software and interaction techniques that enhance existing manual user interfaces with additional eye-based interactions. The thesis also provides detailed experiments on understanding performance of multimodal gaze user interfaces.
- 2013 MSc in Applied Computer Science, University of Duisburg-Essen, Germany
Thesis: *Gaze Calibration for Ubicomp Interfaces*, supervised by Prof. Hans Gellersen
One of the main challenges of eye trackers is their need to calibrate to each user. This work provides a method that intelligently analyses user eye-screen patterns to calibrate implicitly in the background.
- 2011 BSc in Applied Computer Science, University of Duisburg-Essen, Germany
Thesis: *Mid-Air Gestures for Projector Phones*, supervised by Dr. Christian Winkler and Prof. Enrico Rukzio
This thesis investigated interaction techniques based on air gestures to control the mobile phone UI. They are evaluated in a Fitts Law based lab study.

Invited talks, honors, & awards

- 2019 Invited talk at Friedrich-Alexander University of Erlangen-Nürnberg on *Future Multimodal User Interfaces*
- 2019 Invited talk at University of Duisburg-Essen at the HCI lecture, on *Exploring Eye-based and Multimodal User Interfaces*
- 2018 Winner Bundeswehr University internal lab funding contest for *BehaVR: A Behavior-aware Virtual Reality Lab* (160000 €)
- 2018 Invited talk at Ulm University Colloquium Cognitive Systems on *Future Eye-based and Multimodal User Interfaces*
- 2018 Invited talk at Internal Doctorial Colloquium Venice, on *Novel, Mobile, Multimodal Interaction Techniques and User Interfaces*
- 2018 Invited talk at HCILab WinterSchool, on *Enhancing Human-Computer Interaction with Multimodal User Interfaces*
- 2018 Exceptional Review award at CHI
- 2016 SIGGRAPH invited talk for UIST reprise session
- 2015 Best paper nomination ACM UIST 2015 (top 9%)
- 2014 Google Faculty Research Award (\approx 40000 €)
- 2014 Dean's Award for Excellence in PhD Studies at Lancaster University (\approx 500 €)

Teaching & Supervision

UNIVERSITY COURSES

- 2019 Teaching Assistant, Praktikum Usable Security, Bundeswehr University, Germany
- 2019 Teaching Assistant, Course Research Methods in IT Security, Bundeswehr University, Germany
- 2019 Teaching Assistant, Course Usable Security, Bundeswehr University, Germany
- 2018-2019 Teaching Assistant, Course Software Ergonomie, Bundeswehr University, Germany
- 2018 Teaching Assistant, Research Methods in Usable Security, Hochschule für angewandte Wissenschaften, München, Germany
- 2018 Teaching Assistant, Praktikum Usable Security, Hochschule für angewandte Wissenschaften, München, Germany
- 2013-2016 Teaching Assistant, Human-Computer Interaction, Lancaster University, UK
- 2013 Teaching Assistant, Programming Java, Lancaster University, UK

BACHELOR THESIS

- 2018-2019 Abdullatif Dinc, LMU Munich, *3D drawing on 2D pen-and-touch devices*
- 2018-2019 Thomas Mayer, LMU Munich, *Eye Gaze Interaction for a Mobile Text Application*
- 2018-2019 Jan Obernolte, LMU Munich, *Investigating Mid-Air Stylus Interaction*
- 2018-2019 Franziska Lang, LMU Munich, *Novel Concepts for Gaze-based Interaction on Mobile Devices*, supervised with Dr. Mohamed Khamis (University of Glasgow)
- 2016 Benedikt Mayer, LMU Munich/Lancaster University, *Gaze and Hand Based Interaction Techniques for Virtual Reality*, supervised with Dr. Diako Mardanbeki (Lancaster University)
- 2016 Alexander Perzl, LMU Munich/Lancaster University, *Using Eye-tracking in a See-through UI for Virtual Reality*, supervised with Dr. Diako Mardanbeki (Lancaster University)

MASTER THESIS

- 2018-2019 Lukas Antesberger, LMU Munich, *Creating a Toolkit for Eye Tracking on Mobile Phones*, supervised with Dr. Daniel Bushek (LMU)

- 2018-2019 Stefanie Meitner, LMU Munich, *Gaze Interaction Techniques for Augmented Reality*, supervised with Prof. Dr. Augusto Esteves (Napier University)
- 2018 Matthias Geiger, LMU Munich, *Investigating Natural User Behaviour for Biometric Identification in VR*

PHD STUDENT CO-MENTORING

- 2018-2019 Yasmeeen Abrabou, University Bundeswehr Munich, *Eye-tracking for Usable Security*, supervised with Prof. Florian Alt (Bundeswehr University)
- 2018-2019 Rivu Radiah, University Bundeswehr Munich, *Virtual Reality as a Research Tool*, supervised with Prof. Florian Alt (Bundeswehr University)

Scientific Engagements

- 2019 Associate Chair, CHI 2020
- 2019 Associate Chair, Mensch und Computer 2019
- 2019 Program Co-Chair, COGAIN@ETRA 2019
- 2019 Program Committee, ET4S@ETRA 2019
- 2018 Poster Co-Chair, MUM 2018
- 2018 Associate Chair, CHI 2019
- 2015-2019 Reviewer, CHI Conference
- 2015-2019 Reviewer, UIST Conference
- 2017-2018 Reviewer, IMWUT Journal
- 2018-2019 Reviewer, MobileHCI Conference
- 2015-2017 Reviewer, ITS/ISS Conference

References

Prof. Dr. Florian Alt - Professor at Bundeswehr University, Munich, Germany - florian.alt@unibw.de
 Prof. Dr. Hans Gellersen – Professor at Lancaster University, UK - hwg@comp.lancs.ac.uk
 Dr. Ken Hinckley – Microsoft Research, Redmond, US - kenh@microsoft.com
 Prof. Dr. Bill Buxton – Microsoft Research, Redmond, US - bill.buxton@microsoft.com
 Dr. Yang Li – Google Research, Mountain View, US - yangli@acm.org
 Prof. Dr. Enrico Rukzio – Professor at Ulm University, Germany - enrico.rukzio@uni-ulm.de

Miscellaneous

- Languages Fluent in German and English, basic level in Japanese
- Technical skill SPSS, Latex, Adobe Premiere, Office, Unity 3D, Tensorflow
- Programming Java, Android, Processing, C#, Python
- Interests Football, Fitness, Film, Music, Travel

Attachments

Attached are a list of publications, and certificates for my PhD, master, and bachelor studies.

Publications

I have published 22 peer-reviewed papers, that account for about 300 citations and an h-index of 10. I also have a patent from the work with Microsoft Research and my PhD thesis book is published at Lancaster University.

CONFERENCE PROCEEDINGS

- Drewes, Heiko, Ken Pfeuffer, and Florian Alt (2019). “Time- and Space-efficient Eye Tracker Calibration”. In: *Proceedings of the ACM International Symposium on Eye Tracking Research & Applications (ETRA 2019)*. ACM.
- Mardanbegi, Diako, Ken Pfeuffer, Alexander Perzl, Benedikt Mayer, Shahram Jalaliniya, and Hans Gellersen (2019). “EyeSeeThrough: Unifying Tool Selection and Application in Virtual Environments”. In: *The 26th IEEE Conference on Virtual Reality and 3D User Interfaces (IEEE VR’19)*.
- Pfeuffer, Ken, Matthias J Geiger, Sarah Prange, Lukas Mecke, Daniel Buschek, and Florian Alt (2019). “Behavioural Biometrics in VR: Identifying People from Body Motion and Relations in Virtual Reality”. In: *Proceedings of the 37th Annual ACM Conference on Human Factors in Computing Systems (CHI’19)*. Glasgow, UK: ACM.
- Prange, Sarah, Daniel Buschek, Ken Pfeuffer, Lukas Mecke, Peter Ehrlich, Jens Le, and Florian Alt (2019). “Go for GOLD: Investigating User Behaviour in Goal-Oriented Tasks”. In: *Proceedings of the 37th Annual ACM Conference on Human Factors in Computing Systems (CHIEA’19)*. Glasgow, UK: ACM.
- Rivu, Sheikh Radiah Rahim, Yasmeen Abdrabou, Thomas Mayer, Ken Pfeuffer, and Florian Alt (2019). “GazeButton: Enhancing Buttons with Eye Gaze Interactions”. In: *Proceedings of the ACM International Symposium on Eye Tracking Research & Applications (ETRA 2019), COGAIN papers track*. ACM.
- Buschek, Daniel, Sarah Völkel, Clemens Stachl, Lukas Mecke, Sarah Prange, and Ken Pfeuffer (2018). “Experience Sampling as Information Transmission: Perspective and Implications”. In: *Proceedings of the 2018 ACM International Joint Conference and 2018 International Symposium on Pervasive and Ubiquitous Computing and Wearable Computers (UbiComp/ISWC’18 Adjunct)*. ACM, pp. 606–611.
- Mecke, Lukas, Ken Pfeuffer, Sarah Prange, and Florian Alt (2018). “Open Sesame!: User Perception of Physical, Biometric, and Behavioural Authentication Concepts to Open Doors”. In: *Proceedings of the 17th International Conference on Mobile and Ubiquitous Multimedia (MUM’18)*. ACM, pp. 153–159.
- Pfeuffer, Ken and Yang Li (2018). “Analysis and Modeling of Grid Performance on Touchscreen Mobile Devices”. In: *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems (CHI’18)*. ACM, p. 288.
- Pfeuffer, Ken, Ken Hinckley, Michel Pahud, and Bill Buxton (2017). “Thumb+ Pen Interaction on Tablets.” In: *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems (CHI’17)*, pp. 3254–3266.
- Pfeuffer, Ken, Benedikt Mayer, Diako Mardanbegi, and Hans Gellersen (2017). “Gaze+ pinch interaction in virtual reality”. In: *Proceedings of the 5th Symposium on Spatial User Interaction (SUI’17)*. ACM, pp. 99–108.
- Pfeuffer, Ken, Jason Alexander, and Hans Gellersen (2016a). “GazeArchers: playing with individual and shared attention in a two-player look&shoot tabletop game”. In: *Proceedings of the 15th International Conference on Mobile and Ubiquitous Multimedia (MUM’16)*. ACM, pp. 213–216.
- Pfeuffer, Ken, Jason Alexander, and Hans W Gellersen (2016b). “Partially indirect bimanual input with gaze, pen, and touch for pan, zoom, and ink interaction”. In: *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems (CHI’16)*. ACM, pp. 2845–2856.

- Pfeuffer, Ken and Hans Gellersen (2016). "Gaze and touch interaction on tablets". In: *Proceedings of the 29th Annual Symposium on User Interface Software and Technology (UIST'16)*. ACM, pp. 301–311.
- Pfeuffer, Ken, Jason Alexander, Ming Ki Chong, Yanxia Zhang, and Hans Gellersen (2015). "Gaze-shifting: Direct-indirect input with pen and touch modulated by gaze (**Best paper nominee**, top 8%)". In: *Proceedings of the 28th Annual ACM Symposium on User Interface Software & Technology (UIST'15)*. ACM, pp. 373–383.
- Pfeuffer, Ken, Jason Alexander, and Hans Gellersen (2015). "Gaze+ touch vs. Touch: What's the Trade-off When Using Gaze to Extend Touch to Remote Displays?" In: *IFIP Conference on Human-Computer Interaction (INTERACT'15)*. Springer, Cham, pp. 349–367.
- Pfeuffer, Ken, Yanxia Zhang, and Hans Gellersen (2015). "A collaborative gaze aware information display". In: *Adjunct Proceedings of the 2015 ACM International Joint Conference on Pervasive and Ubiquitous Computing and Proceedings of the 2015 ACM International Symposium on Wearable Computers (Ubicomp'15 Adjunct)*. ACM, pp. 389–391.
- Pfeuffer, Ken, Jason Alexander, Ming Ki Chong, and Hans Gellersen (2014). "Gaze-touch: combining gaze with multi-touch for interaction on the same surface". In: *Proceedings of the 27th annual ACM symposium on User interface software and technology (UIST'14)*. ACM, pp. 509–518.
- Pfeuffer, Ken, Melodie Vidal, Jayson Turner, Andreas Bulling, and Hans Gellersen (2013). "Pursuit calibration: Making gaze calibration less tedious and more flexible". In: *Proceedings of the 26th annual ACM symposium on User interface software and technology (UIST'13)*. ACM, pp. 261–270.
- Vidal, Melodie, Ken Pfeuffer, Andreas Bulling, and Hans W Gellersen (2013). "Pursuits: eye-based interaction with moving targets". In: *CHI'13 Extended Abstracts on Human Factors in Computing Systems (CHI EA'13)*. ACM, pp. 3147–3150.
- Winkler, Christian, Ken Pfeuffer, and Enrico Rukzio (2012). "Investigating mid-air pointing interaction for projector phones". In: *Proceedings of the 2012 ACM international conference on Interactive tabletops and surfaces (ITS'12)*. ACM, pp. 85–94.
- Alt, Florian, Alireza Sahami Shirazi, Andreas Kaiser, Ken Pfeuffer, Emre Gürkan, Albrecht Schmidt, Paul Holleis, and Matthias Wagner (2010). "Exploring ambient visualizations of context information". In: *2010 8th IEEE International Conference on Pervasive Computing and Communications Workshops (PERCOM Workshops)*. IEEE, pp. 788–791.

ARTICLES

- Serim, Barış, Ken Pfeuffer, Hans Gellersen, and Giulio Jacucci (2018). "Visual Attention-Based Access: Granting Access Based on Users' Joint Attention on Shared Workspaces". In: *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT'18)* 2.3, p. 133.
- Zhang, Yanxia, Ken Pfeuffer, Ming Ki Chong, Jason Alexander, Andreas Bulling, and Hans Gellersen (2017). "Look together: using gaze for assisting co-located collaborative search". In: *Personal and Ubiquitous Computing (PUC'17)* 21.1, pp. 173–186.

PATENTS

- Hinckley, Kenneth P, Michel Pahud, William Arthur Stewart Buxton, and Ken Pfeuffer (2018). *Thumb and pen interaction on a mobile device*. US Patent App. 15/437,387.

PHD THESIS

- Pfeuffer, Ken (2017). *Extending touch with eye gaze input*. English. Lancaster University.

Dr. Ken Pfeuffer
<http://www.kenpfeuffer.com>